

## Claims

1. A method of inspecting a stencil having apertures through which a substance is deposited onto an electronic substrate comprising:

5 depositing the substance through the stencil and onto the substrate;  
capturing a first image of the stencil after the deposit of the substance and detecting variations in texture of the substance in the first image;

capturing a second image of the electronic substrate having the substance on its surface and detecting variations in texture of the substance in the second image;

10 defining a region of interest in the first image and in the second image to determine whether at least one feature exists in the region of interest;

measuring a first span of the at least one feature in the region of interest in the first image and a second span of the at least one feature in the region of interest in the second image; and

15 correlating the first span of the at least one feature and the second span of the at least one feature to determine whether a threshold span of the at least one feature has been reached.

2. The method of claim 1 wherein the at least one feature includes at least one of  
20 a short circuit, a bridge-like feature, a bridge, an excess quantity of the substance, and a stray area of the substance.

3. The method of claim 1 further comprising altering a process by which the substance is deposited on the electronic substrate when the threshold span of the at least one  
25 feature has been met or exceeded.

4. The method of claim 1 wherein the step of correlating is accomplished in accordance with at least one detection parameter.

30 5. The method of claim 4 further comprising computing, for each feature in the region of interest, an area and geometry of the at least one feature, the computation accomplished using at least one detection parameter.

6. The method of claim 5 further comprising determining, based on the area and geometry, that the at least one feature in the image requires a corrective action.
7. The method of claim 1 wherein the electronic substrate is a printed circuit  
5 board.
8. The method of claim 1 wherein the substance includes solder paste.
9. A system for dispensing solder paste at a predetermined location through a  
10 stencil on a substrate comprising:  
a dispenser that dispenses material through the stencil and on the substrate;  
a vision system electrically coupled to the controller to capture images of the stencil;  
a controller for maintaining the operations of the dispenser; and  
a processor in electrical communication with the controller, the processor being  
15 programmed to:  
perform texture-based recognition of an image of a solder paste deposit  
located on the stencil,  
define a region of interest within the image of solder paste, the defined region  
of interest having a first axis, wherein a set of pixels in the image lie along the axis;  
20 compute, for each pixel along the axis, a sum of all the pixels in the region of  
interest that are in perpendicular alignment with the respective pixel along the axis;  
represent the sums of each pixel along the axis as a single dimensional array  
perpendicular to the axis; and  
evaluate the single dimensional array to determine whether any defects exist in  
25 the region of interest.
10. The system of claim 9 wherein the substrate is a circuit board.
11. The system of claim 9 wherein the defects include at least one of a short  
30 circuit, a bridge, an excess quantity of solder paste and a stray area of solder paste.

12. The system of claim 9 wherein the processor is further programmed to compute, for each defect in the region of interest, an area and geometry of the defect, using a detection parameter and the single dimensional array.

5 13. The system of claim 9 wherein the processor is further programmed to perform texture-based recognition of a solder paste deposit located on the substrate and compare solder paste deposits on the substrate with solder paste deposits on the stencil.

10 14. A method of detecting a defect in a substance deposited through a stencil and onto a substrate, comprising:  
capturing an image of the stencil;  
detecting variations in texture in the image to determine a location of the substance on the stencil;  
defining a region of interest in the image, the defined region of interest having a first  
15 axis, wherein a set of pixels in the image lie along the axis;  
computing, for each pixel along the axis, a sum of all the pixels in the region of interest that are in perpendicular alignment with the respective pixel along the axis;  
representing the sums of each pixel along the axis as a single dimensional array perpendicular to the axis; and  
20 evaluating the single dimensional array to determine whether any defects exist in the region of interest.

15. The method of claim 14 wherein the substance comprises solder paste.

25 16. The method of claim 14 wherein the defect comprises at least one of a solder bridge, a bridge-like feature, or an excess paste feature.

30 17. The method of claim 14 wherein the stencil includes first and second apertures, separated by a distance, through which the solder paste is deposited and the defect comprises the existence of solder paste spanning at least a portion of the distance between the first and second apertures.

18. The method of claim 14 further comprising applying a rule to determine whether the defect should be classified as a solder bridge.

5 19. The method of claim 14 further comprising actuating a stencil wipe procedure when a defect exists in the region of interest.

20. A method of inspecting a stencil having apertures through which a substance is deposited onto an electronic substrate comprising:

10 depositing the substance through the stencil and onto the substrate;  
capturing a first image of the stencil after the deposit of the substance and detecting variations in texture of the substance in the first image;

capturing a second image of the electronic substrate having the substance on its surface and detecting variations in texture of the substance in the second image;

15 defining a region of interest in the first image and in the second image to determine whether at least one feature exists in the region of interest;

measuring a first span of the at least one feature in the region of interest in the first image and a second span of the at least one feature in the region of interest in the second image;

20 correlating the first span of the at least one feature and the second span of the at least one feature to determine whether a threshold span of the at least one feature has been reached; and

actuating a stencil wipe to clean a surface of the stencil when it is determined that the threshold span has been reached.

25 21. A method of dispensing material at predetermined locations through a stencil and onto an electronic substrate, the method comprising:

dispensing the material through the stencil and onto the substrate;

performing texture-based recognition of a predetermined location of the material on the stencil;

30 determining whether there is at least one feature in the predetermined location on the stencil;

comparing the at least one feature on the stencil with a position of the substance on the substrate to determine whether the at least one feature is a defect; and

actuating a stencil wipe procedure when the at least one feature is determined to be a defect.

22. The method of claim 21 wherein the at least one feature includes at least one  
5 of a defect, a short circuit, a bridge-like feature, a bridge, an excess quantity of the substance  
and a stray area of the substance.

23. The method of claim 21 wherein the electronic substrate is a printed circuit  
board.  
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24. The method of claim 21 wherein the substance includes solder paste.

25. The system of claim 24 further comprising performing texture-based  
recognition of a solder paste deposit located on the substrate and comparing solder paste  
15 deposits on the substrate with solder paste deposits on the stencil.